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The recent evolution of instructional programs in colleges of agriculture has made them more usefu" to society and meaningful to the academic community. Seminars aimed at improving the effectiveness of teaching have also improved the quality of faculty counseling for undergraduates and graduates. For more than 10 years, curricula have been carefully designed with future professions in mind, and courses in the natural resources, such as wildlife and park management, recreation planning, and others, are now included in the curricula of all colleges of agriculture. Flexibility in program planning has resulted partly from an increasing percentage of job-oriented students who want to specialize in particular disciplines. Education for international agriculture has expanded to include study and experience in foreign universities. Statewide instruction accommodates students who cannot major in their chosen field at particular colleges. A major obstacle to broader use of computers for instructional purposes is the lack of familiarity with and understanding of them: one solution would be the retraining of faculty. Interstate college agreements would permit the sharing of expensive facilities and faculty if higher enrollments in specialized courses justified consideration of such arrangements. (WM)

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BY

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NEW DIMENSIONS IN INSTRUCTION

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My charge is to review the "new dimensions" in organization, programs, and scope of operations in colleges of agriculture that have made these colleges more meaningful in the academic community and more useful to society.

Rather than give you a "box score" of the number of institutions that have combined the animal sciences or adopted a new curriculum in recreation planning, this presentation is designed to paint with a fairly broad stroke the recent evolution of the instructional program of our colleges of agriculture. It is intended to identify major changes and to place these changes in perspective, to relate them to the circumstances that prompt change, and to recognize the faculty attitudes that determine the direction and speed of change.

This presentation will include some specific examples, will suggest a few opportunities ahead, and will identify a few cautions.

It is further my purpose to give credit to the many imaginative faculty who have achieved needed change in the classroom, in curriculum committee meetings, in department heads' chairs, and in directors' and deans' chairs.

This presentation will not touch all timely topics in college of agriculture instructional programs. Rather, I have chosen those which seem to be at the forefront in some of your minds and that I believe will command our time and attention in the months ahead.

Effective Instruction

If only all colleges of all universities had developed and maintained the sincerity of purpose and interest in undergraduate and graduate instruction that colleges of agriculture nationwide have demonstrated the past decade and a half, it is my opinion that we would have in our universities students receiving a better education, with a higher respect for knowledge, and with a higher respect for the university. The importance of the individual student and of the instruction effort in colleges of agriculture is evident to all.

Directors of resident instruction in the Southern Region have for more than a decade sponsored annual workshops for selected teachers. The North Central Region implemented this idea in 1967.

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The use of teacher rating forms for teacher self-improvement in colleges of agriculture is commonplace. Alpha Zeta, Gamma Sigma Delta, departmental clubs, and other groups in and associated with colleges of agriculture give awards, ranging from recognition certificates to $1,000 prizes, to outstanding teachers.

Most colleges of agriculture sponsor teaching seminars, aimed directly at improving the effectiveness of the instructor in the classroom, or the laboratory, or in some other way directly improving his effectiveness with and benefit to the undergraduate or graduate student.

The University of Kentucky, Texas A&M, Oklahoma State, Iowa State, South Dakota State, and many others are among those who have aggressive and productive seminars for their college of agriculture faculty. In a few cases, for example at our own institution, the seminar committee has extended an invitation to the rest of the university faculty to join, and a significant number have accepted this invitation. It is our policy that participation in these seminars is expected of all graduate teaching assistants in our college, NDEA fellows, and new instructional faculty in our college.

One or two colleges of agriculture in the last year or so have held a one- to three-day retreat for their faculty to concentrate on and discuss teaching concerns.

Credit should also be given to the administrative organization of most colleges of agriculture, which provide a front-office administrator--director of resident instruction is the title most often used--whose time, talent, and energy are directed to the instructional function.

Academic Advising

Colleges of agriculture have likewise accommodated well the undergraduate and graduate students through a good system of academic advising. On some campuses the system is more formal than on others, but, especially where students are permitted to choose their agricultural major early and where freshman or sophomore courses in the major are available to these students, rapport develops rapidly, the adviser becomes useful to the advisee, and students tend to perform close to their ability level. In some colleges of agriculture faculty time is budgeted for the academic advising function, workshops for academic advisers are held, and the evaluation of a faculty member at promotion or pay-raise time is made in part on how well he performs this advising role. Benefits of such a system are well documented.

Curriculum Changes

Nationwide, in colleges of agriculture, there has been a ready response to the needs of society for trained people to help manage those renewable natural resources that have become more dear to us and that permit us to enjoy our increased leisure time. In the past decade a number of colleges of agriculture have started curricula in wildlife management, park management, recreation planning, etc. Whether these curricula be in colleges of agriculture or elsewhere in the university structure, the enrollment has grown rapidly, in one case from zero to 275 students in eight years.

In establishing and encouraging enrollment in the relatively new curricula related to natural resources in colleges of agriculture, many faculty and administrators have made it clear that the goal of the university in such developments is not to turn its back on traditional agriculture but rather to utilize some of the subject matter competencies, the equipment, the educational philosophies, and the existing resources more broadly and generously to provide education in these related biological areas. We recognize, too, that in some states traditional agriculture has, in a way, turned its back on the college of agriculture by moving to other states with less population density, so the colleges of agriculture have had to adjust rapidly and obliquely to new fields of endeavor.

Most directors of resident instruction tell me that their enrollment increases have been primarily in these natural resource-related curricula and in animal science. Why animal science? It may be the association with veterinary medicine; it may be the glamour that animals hold for urban and rural, nonfarm students, and we have more of these; it may be that the feed, meat packing, and animal food product industries have done a good job of selling their industries and professions to young people. It may be interest in laboratory animals. But across the country the animal sciences enrollments have increased rapidly.

From about 1956 to 1965 a high proportion of colleges of agriculture developed, within their majors or curricula in traditional agriculture, options in science, production (or technology), and business (or industry). There was a growing realization in the 1950's that 25 to 50 percent of the graduates in animal science, agronomy, or similar curricula take their first employment, and many remain in the nonfarm industries allied to agriculture. Faculty decided their graduates should be better equipped in such topics as business law, accounting, personnel management, etc.

Usually, to make room for the business courses, some nonmajor agricultural courses were omitted from the curriculum. The animal science students pursuing a business option took very little agronomy. The agronomist was able to get only the introductory course in animal science, etc. This shift was hard for some faculty in colleges of agriculture to take, but I believe most would agree that this movement was justified and good.

In the late 1950's and early 1960's there also developed on a few campuses broader curricula in agriculture, such as agricultural science or agricultural business. These seemed to come along as a result of curriculum committee discussions and sometimes at the suggestions of administrators. The main reasons advanced were students often don't know exactly what discipline within agriculture they want to major in. The curriculum in agricultural science might be good for a young man planning to be a graduate student.

Very few of these "broader agriculture curricula," however, have caught on. I think the reason is that they generally do not provide a departmental home. Students in our colleges of agriculture, even more than other students on our campus, apparently want to identify themselves with a particular discipline, a particular group of faculty, and a particular occupation or profession. We might call them job-oriented. Studies have shown that our students come to the university to equip themselves to be a specialist in a particular field, not just for the "sake of getting an education."

Some faculty have even suggested that we may be moving toward a common undergraduate curriculum for all students in our colleges of agriculture and permit specialization only at the master's degree level. In my opinion, this is not likely to occur, for several significant reasons: (1) The previously mentioned job-oriented motivation of our students. (2) The extreme improvement that has been made in the level of education students have when they leave high school. And further improvement is ahead. (3) It is unlikely that society will be willing to pay the cost of prolonging the education in the early years of the life cycle. I think society would prefer to permit specialization at the earliest practical stage, then invest in continued adult education through the productive lifetime. Rapidly developing programs in continuing adult education, designed to accommodate professional workers' needs for new professional skills, support this premise.

The next step, in my opinion, will be toward "majors" and "minors," in place of traditional "curricula" in colleges of agriculture. College of agriculture faculty and administrators have repeatedly rejected curriculum accreditation, for many reasons, so fixed curricula patterns need not be maintained for that purpose. Increased flexibility in program planning is usually desired and justified by students and their concerned advisers. The major and minor system, already in use at Iowa State, permits the student and his adviser that flexibility, allows identification of the second or third area of specialization by the student, and may well encourage more curriculum interaction between colleges of agriculture and departments in colleges of arts and sciences. A student majoring in animal science may minor in chemistry or political science. And I wouldn't mind seeing a few history majors take minors in agricultural economics or wildlife.

Independence in Curriculum Thought

In the decade of the 50's and a few years following, faculty in some colleges of agriculture developed considerable self-consciousness about their colleges, their curricula requirements, the quality of their students, even their own disciplines. Perhaps it was because the 50's was accepted as the decade of the physical sciences. Perhaps it was due to the enrollment decline in agriculture after 1955. Perhaps it was Sputnik and the recoil away from "vocational curriculums."

Some agriculture faculties reacted by saying, "We aren't concerned about numbers; we want quality," and implemented a very rigorous standard freshman year. Some said, "We're just as professional as the engineers," and added the engineering math sequence to all curricula. Some said, "We aren't 'vocational,'" added 20 credits of social sciences and humanities, and decreased the number of courses in the major field.

In the 60's, however, faculty attitudes have changed. Effects of curriculum changes of the 50's have been carefully reviewed and assessed. Society is concerned about "feeding the hungry world" and so also about agriculture. Enrollments in colleges of agriculture have surged--growth has in many cases been much faster in agriculture than in other disciplines on university campuses. Faculty are more content--secure--in their relative position on the campus. This has brought a change in faculty attitude and thought regarding curricula.

One college interrupted the college-wide requirement of engineering math and adopted a course in finite math for agriculture business majors and those in business options. One college considered the fact that their graduates will be users of scientific data, so they must be able to interpret it and judge its significance, and added undergraduate statistics as a requirement.

A director has proposed to his faculty that a "level of competence" in basic communication be required rather than "nine credits of freshman English." If a student comes to the university with the competence, he would be free to use the nine credits on advanced courses in communications. Studies on one campus have indicated no form of freshman English has been of measurable benefit in improving communication skills of agriculture students in recent years. The college curriculum committee is, therefore, considering a recommendation that freshman English be dropped completely from their agricultural curriculum.

Agriculture deals with living materials; biochemistry is the chemistry of life. Several colleges of agriculture have added biochemistry to their plant and animal curricula; a few are pressing their chemistry departments to get biochemistry into the earlier parts of their course sequences.

My intent here is not to criticize the curriculum changes made in the 50's or to give blanket endorsement to the recent changes and proposals for change. Rather, it is to convey that agriculture faculty have, in recent years, demonstrated confidence and independence in curriculum thought.

They are less concerned about how faculty in other colleges view them and their programs and their students.

They are designing curricula for their students, the sciences and professions they will enter, and the educational needs they have.

International Agriculture

It has been estimated that 50 percent of our college of agriculture graduates will travel or work in a foreign country during their productive lifetime and that 30 percent will have specific employment in or business relations with persons in foreign countries. The importance, therefore, of international experience or education as a part of the curriculum in colleges of agriculture has become paramount in the minds of administrators and faculty, especially those who've been involved in foreign programs.

For several years the Iowa State University College of Agriculture Travelcourse has gone to Europe for three to five weeks of exposure to agriculture on the continent. Undergraduate students from Kansas State, Mississippi State, and perhaps other colleges of agriculture have spent one or more semesters of their undergraduate program working on a foreign campus or with a team of American technicians in another country.

At the graduate level this is less uncommon. As a part of AID or foundation contract programs, several American students have completed their thesis work under domestic faculty or native faculty at foreign universities.

Undergraduate programs, in international agriculture, including a list of recommended courses for inclusion in the student's major curriculum, are spelled out in the catalogs for a number of the colleges of agriculture. The common experience has been that a significant number of students express interest in such programs during the freshman or sophomore year, but not more than one or two in each class take advantage of the full program.

A few institutions, including South Dakota State and Iowa State, have tagged undergraduate scholarships for students who will take a certain number of credits in a foreign language. These and other incentives, in my opinion, will have to be extended to make these programs really effective.

Oregon State and several other universities report highly successful seminars, designed to expose students in the agricultural sciences to opportunities and challenges on the international scene. The University of Nebraska held this past week a very effective conference for high-ability high school science students on the topic, "Food for a Hungry World."

These experiences and other observations suggest that the technique for preparing American students for international agriculture will not be via separate curricula or even, perhaps, separate courses, but rather via (1) the development of an awareness through conferences and seminars, (2) the development of an international attitude by exposure to our faculty who've served

overseas, and by (3) the development of an international technological competence (and confidence in that competence) by teaching soils or animal nutrition or plant ecology as a world-wide subject, rather than as a South Dakota or Michigan subject.

New Teaching Techniques

The computer has been put to work in the teaching programs of colleges of agriculture, for linear programmming in farm and agricultural business management and for design problems in agricultural engineering. The computer is also used by progressive animal breeding instructors to demonstrate changes in a population that would result from applied selection pressure or, by wildlife ecologists, to demonstrate changes that would result from specific natural selection pressure.

Southern Illinois has developed a computerized student response system for testing or for determining how well students understand concepts presented by the instructor.

Unfortunately, I have been able to find no instance in which the computer is being used to teach ration formulation or in which the undergraduate student is being schooled in exploiting the computer for other agricultural uses, such as making fertilizer recommendations from soil test data.

It is obvious that a major bottleneck to the more rapid use of the computer in undergraduate or graduate instruction is the lack of understanding of and familiarity with this tool by our faculty. The very fact that on campus after campus the only use presently being made is in agricultural engineering, economics, and animal breeding or ecology implies it is being used by those faculty who in their own graduate training used the computer for their research. This is a severe and costly bottleneck in our instructional program. If our graduates are to compete in industry or in the scientific disciplines, they must understand the computer and its uses. It seems to me that an understanding of the computer is as essential to the undergraduate today as was the use of the pencil sharpener in 1920.

The solution lies, in my opinion, in quick retraining of faculty, on campus or via the sabbatical leave.

Audio-tutorial booths are employed by many colleges of agriculture for instruction. Applications range from range management and soils at Oregon State to horticulture at Penn State, meats at Iowa State, and plant pathology at the University of Wisconsin. Though viewed with suspicion by some faculty, the merits of this system inspire us to consider broader application.

In our own college, for example, we are using audio-tutorial booths for 950 students this semester in freshman biology. We believe our instruction is more effective than with former methods. Students can spend as little time or as much time as they need to gain the concepts, to learn the material.

Our laboratories are manned with faculty from 7:30 a.m. to 10:30 p.m., 79 hours per week. When the student needs explanations and help, he has a one-to-one student-faculty ratio.

On our campus classroom space is scarce, so we appreciate the fact that we have freed two of three laboratories, formerly used by this course, for other purposes. In one, we have separate booths for (1) biology make-up, for students who missed the previous week, (2) a junior course in plant anatomy, and (3) a course offered by another department, plus (4) space for a discussion group.

The University of Missouri, Ohio State, the University of Arizona, South Dakota State, and many others report use of closed-circuit television to make more effective and efficient use of higher quality instructors for lecture purposes, to magnify demonstrations in many courses, and, with the employment of video tapes, to teach live animal and carcass evaluation, to bring field observations to the classroom, etc. Video tapes are also used for teacher training in agriculture, home economics, and other disciplines. The University of Wisconsin reports, in one case, a 30 to 40 percent increase in quantity of material that can be covered within a class period by the use of video tape. There is likely a tendency for the professor to prepare better when he tapes his lectures.

Colleges of agriculture have made less use of video tapes, closed-circuit television, or the audio-tutorial system than colleges of arts and sciences, because we generally do not have as many extremely large classes. In recent months, however, I have been impressed with the higher quality and more effective instruction many of these new devices permit, and that they have potential application and exploitation in some of our low-enrollment courses. In such upper division courses, especially, the student is fairly familiar with the faculty; when he needs help, he can step across the hall or into the lab to consult with faculty. Once the course is developed, little investment in professional manpower would be needed each semester, except for regular up-dating.

Statewide Instruction

Many colleges of agriculture have been aggressive in offering instruction in their disciplines statewide. Purdue University provides faculty for classroom instruction on several campuses; the University of Wisconsin at three extension centers provides video-taped introductory courses in agriculture. Iowa State University offers at six locations each winter a graduate-level course for professional agricultural workers, vocational agriculture teachers, Soil Conservation Service workers, Extension Service workers, etc. Courses are generally in agricultural economics, animal science, agronomy, or education and are rotated among the locations each year. Mississippi State has a similar program. Also, at the University of Missouri, Columbia, a telelecture employing the electronic blackboard is used to relay to graduate students in Kansas City a course in atmospheric science.

Within the past five years most colleges of agriculture in states with a junior college system have worked diligently with the faculty and the administration of these junior colleges to mesh curricula offerings. Many have urged that junior colleges not teach technical agriculture because of its high cost, the difficulty in obtaining qualified teachers, shortage of laboratory equipment, etc. Where agriculture is offered at the junior college, the state university usually reserves the right to, in effect, certify the teacher and the course by giving or withholding credit in the professional curriculum when the student transfers to the state university. In some states the colleges of agriculture have offered the junior college video-taped courses, or at least conferences during the summer in which course outlines, workbooks, and methods of teaching might be discussed and shared with university faculty.

Interstate Agreements

A continuing problem to colleges of agriculture is the highly specialized, costly, and sometimes low-enrollment curriculum--feed technology, landscape architecture, poultry science, etc. Many attempts have been made at inter-state agreements which would permit sharing of unique and expensive facilities and faculty among states. Formal organizations, corporations, etc., have been established, regional offices furnished and staffed, and intricate memorandums of agreement prepared and signed. These are designed to serve all disciplines, in most cases, and have been heralded by many legislatures.

It is fortunate that other disciplines of the land-grant colleges and state universities have benefited from these regional efforts. For the most part, benefit to the agricultural disciplines has been small. Perhaps the one exception is veterinary medicine. It is a specific enough discipline and leads to a readily identifiable professional degree and occupation. The motivation among students who want to be veterinarians is high enough that they will, if no college of veterinary medicine exists in their state, move to another state for their professional training even after having spent two or three years at a home-state institution.

For most of the other agriculturally related disciplines, this is not the case. The administration and faculty at Kansas State University worked diligently several years ago with equally concerned administrators and faculty from the University of Nebraska, Iowa State University, and the University of Missouri to develop through the Mid America State Universities Association a program whereby students in these other states could take advantage of the feed technology faculty and facilities on the Kansas State campus, during their junior or junior and senior years. Plans with Nebraska and with Missouri were formalized. A Nebraska-based feed company established a scholarship to encourage involvement by Nebraska students. In the case of Missouri, the agreement voided nonresident tuition and permitted Kansas students to take certain programs not available in Kansas at one of the Missouri campuses.

To my knowledge, despite continued enthusiasm for the program by faculty and administrators in these states, not one student from Missouri or Nebraska has taken advantage of this opportunity.

It is my opinion that these regional and interstate compacts and agreements yet hold promise. Presently Oregon State and the University of Hawaii are developing a cooperative agreement where students could maintain their registration at Oregon State but take one or more years in the School of Tropical Agriculture at the University of Hawaii to prepare themselves better for foreign service.

Much energy has been expended in developing interstate agreements and we must keep the doors open. But rewards of heavy use will not be quick in coming.

Low-Enrollment Courses

Curricula don't cost much money in a university, but courses do! Low enrollments in certain courses in our colleges continue to plague us. Cost analyses, teaching load surveys, and space utilization studies by central university administrations have "put the pressure on" administrators and faculty in colleges of agriculture to do something about these high-cost courses.

Several weeks ago we received from the research analyst in our central administration summaries of low-enrollment courses. At our next administrative staff meeting, discussion of the summaries brought quick reactions: (1) this isn't fair--agriculture has more graduate courses; (2) this isn't fair--a lot of these courses are highly important to South Dakota and we have to offer them; (3) this isn't fair--some of these are seminars and special problem courses, even judging team courses where we want to limit enrollment.

These reactions, though quick in coming and given loud and clear, were eventually overcome by the idea that these studies do give us some facts with which to make decisions. They give us an opportunity to manage more wisely, and hopefully more effectively, our resources.

A year earlier, Dr. B. L. Brage, director of resident instruction, had made a similar and detailed enrollment analysis of the courses within our college, and had discussed the analysis with department heads. That very week, one of the department heads consulted with his staff, shifted seven junior-senior courses to an alternate-year basis, and informed all students of the change by letter. The students were happy; they knew there would be enough students enrolled when the course was given so that the could count on it not being dropped for low enrollment. The faculty were happy; they could make better use of their time. And we gave the department head a very good salary boost on July 1.

Motivation for Management

I think it is interesting that these studies on teaching efficiency have been done, for the most part, at the university level. It is also noteworthy that deans, directors, and department heads assume a defensive position when the summaries are released.

There is a reason. Most department heads and some deans and directors are in a position of "defensive management" of teaching resources.

In most university teaching budgets, funds are appropriated or allotted to strict categories--salaries, labor, travel, and O&M. And allocations to departments are within these categories and are based largely on history--last year's budget allotment, for example.

The department head is in a "straight jacket." He obviously wants "his share." The safest way to get it is to ask for last year's salaries, plus 10 percent; last year's labor, plus 10 percent; last year's travel, plus 5 percent, etc. If he or his faculty have an idea that would make teaching more efficient and that would require one less instructor, $4,000 more O&M, and $1,000 more travel, do you think he'll propose it?

We have had the same situation in some agricultural experiment stations. The department head is not really given the privilege of allocating resources among projects. The project budgeting is done in the director's office, often under the same constraints--salary, labor, etc.--even number of positions. When a project is nonproductive or has slipped to the low end of the priority scale, the director has an extremely difficult time persuading the department head to close the project. The department head is afraid he will "lose the money."

The past two years we have used a different system in our station. We reach a judgment on the number of dollars (state and federal grant) that we want to invest in the research program in each department. We instruct the department head to divide the money among the approved projects and, within projects, among salaries, labor, travel, equipment, and supplies. We reserve the right, of course, to approve or disapprove allocations. We guarantee to the department head that, if he recommends and we approve closing two projects so his faculty can intensify effort on others, or closing one and initiating a new one, the number of dollars assigned to his department for the fiscal year will remain unchanged.

This puts the department head in a position of positive or offensive management, rather than defensive management. He has a built-in incentive to initiate changes. He wants his research program productive, responsive to his industry, and he is in a position to pursue these goals without wasting his time and ours defending the status quo. Though he may yet face resistance from faculty, this system removes one of the major roadblocks to the department head's making changes in projects.

Perhaps we could apply this concept to budgeting in the teaching program. My proposal is that the dean seek a system that permits him to assign instructional funds to departments, as a block, based on his total information and judgment about that department's status and needs (adequacy of equipment, enrollment trends, quality of instruction, etc.), assuring the department that any efficiencies it can achieve, any improvement it can make in classroom or laboratory teaching systems, will accrue to the benefit of that department and its students.

Under this system I think we would find department heads making efficiency studies, initiating changes these studies would suggest, and proudly displaying them to their directors and deans.

It seems to me imperative that we put the incentive at the lowest management level possible within our organization and that we put every "manager" in a position of positive management. Only then will we get the most effective management.

This time of budget squeezes in all functions of colleges of agriculture, teaching, research, and extension, is really a golden opportunity for deans, directors, and department heads to develop and test their ability as managers.

Perhaps this is an unfair comparison, but I don't think it was very hard for a dean, director, or department head to be a hero to his faculty in the late 1940's or early 1950's in extension, research, and instruction when budgets were expanding rapidly. New programs could be started with new money. Most departments could have growth in program and in faculty numbers.

But today, in most states, we are in a different "ballgame." Most new projects, in teaching, research, or extension, need to be financed with the money released from outmoded or lower priority activity. It will be harder to be a hero, as a dean, director, or department head, but I think that, once we make the changes in resource assignment that our state or university may require, it will be a lot more rewarding to us and we'll have a lot more personal satisfaction.

Summary

Colleges of agriculture nationwide in the late 1960's unquestionably stand taller in the eyes of our colleagues, are likely wider in the eyes of the taxpayer, and seem deeper in the eyes of the student.

These dimensions of our instructional program in colleges of agriculture are supplemented by other "dimensions."

1. Colleges of agriculture have dedicated themselves to effective instruction.

2. Colleges of agriculture faculty have served their students as effective academic advisers.

3. Curriculum changes have broadened the colleges--primarily to include the natural resources--and have been in response to society's needs.

4. There is evident in agriculture faculty a new confidence and independence in curriculum thought.

5. Education for international agriculture is being achieved by means other than special curricula.

6. New teaching techniques are being exploited in most colleges of agriculture. Benefits include more effective instruction and efficient offering of low-enrollment courses, as well as ability to handle large classes.

7. Colleges of agriculture have been aggressive in offering and/or being concerned about college-level agriculture instruction statewide.

8. Interstate pacts exist to accommodate students who can't major in their chosen field within their home state. But there is little exploitation of these opportunities in the agricultural sciences.

9. Low-enrollment courses in colleges of agriculture present a significant challenge to deans, directors, department heads, and faculty.

10. Many department heads are in a position of defensive management of the instructional function. A system of budgeting to permit positive management, with incentive at every level of management, is proposed.

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